



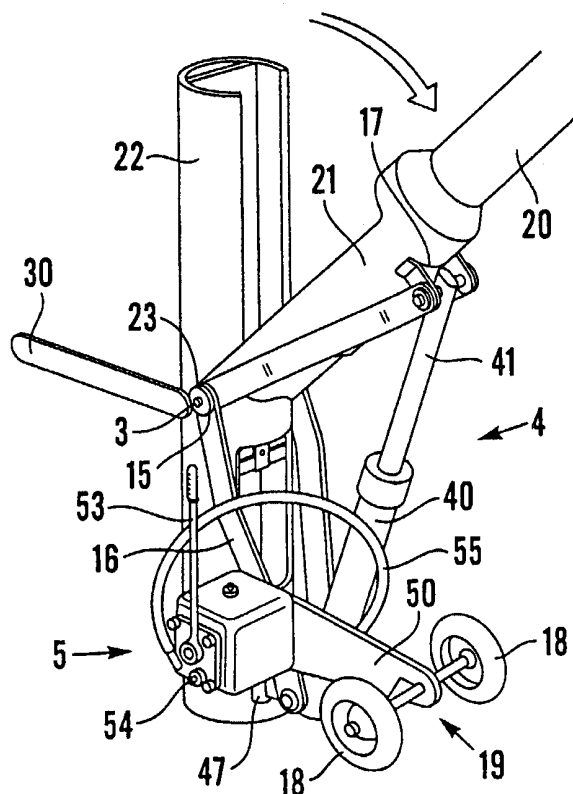
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : E04H 12/34, 12/18</p>	<p>A1</p>	<p>(11) International Publication Number: WO 00/63512 (43) International Publication Date: 26 October 2000 (26.10.00)</p>
<p>(21) International Application Number: PCT/GB99/01202 (22) International Filing Date: 20 April 1999 (20.04.99) (71) Applicant (for all designated States except US): ABACUS HOLDINGS LIMITED [GB/GB]; Sutton in Ashfield, Nottinghamshire NG17 5FT (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): JENVEY, Alan, John [GB/GB]; 16 Vernon Road, Kirkby-in-Ashfield, Nottinghamshire NG17 8EJ (GB). (74) Agent: STAGG, Diana, Christine; Lewis & Taylor, 144 New Walk, Leicester LE1 7JA (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report.</p>

(54) Title: COLUMN COUNTERBALANCING APPARATUS

(57) Abstract

Counterbalancing apparatus for a lamp column (2) in which an upper part (20) of the latter is pivotally mounted (23) on a fixed lower part (22) so that the upper part (20) can be swung down for lamp servicing, comprises a hydraulic ram (4) arranged to have a bearing engagement (17, 47) with the column parts (20, 21, 22) and to be linked (14, 15, 16) to the lower part (22) in order to safely restrain lowering of the upper part (20) or to counterbalance and assist or effect raising thereof. Alternatively a single or double acting ram or rams (4, 44) have a removable pivotal connection (46, 43; 42, 26) with respective column parts (20, 22) so as to act between them. For mobility and ease of application the apparatus is wheel mounted (18, 19, 190).



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Column Counterbalancing Apparatus

This invention relates to apparatus for use in counterbalancing a column (such as is used for supporting lighting apparatus) where the column consists of an upper column part pivotally mounted about a horizontal axis on a lower fixed column part whereby the upper part can be
5 swung down for convenient servicing of an appliance at the normally upper end of the column.

Since the upper column part can be of considerable weight it is necessary to provide adequate support for it during such lowering and raising of the upper column part so that the operation is facilitated and possible damage or injury avoided or minimised.

10 The object of the invention is to provide effective counterbalancing apparatus whereby general use and operative engagement or connection of the apparatus with a column can be readily carried out. Practical advantages in this and other respects will be apparent from the following description.

Basically according to the invention column counterbalancing apparatus comprises fluid
15 pressure operated means such as a single or double acting ram or rams which can be engaged with, or connected to, respective upper and lower parts of a column so as to act between them in counterbalancing lowering of the column upper part or raising thereof.

Practical examples of the apparatus according to the invention will now be described with reference to the accompanying drawings which are mainly perspective views and in which:

20 Figures 1 to 3 show a single acting hydraulic ram operated form of the apparatus;

Figures 4 and 5 diagrammatically show locking plate operation and corresponding column movement; and

Figures 6 to 9 and 10 to 12 respectively show double acting hydraulic ram operated forms of the apparatus.

Like parts are referred to throughout the drawings by the same or similar reference numerals.

A single acting hydraulic ram operated form of the apparatus 1 is shown in Figures 1 to 3 in which a single acting hydraulic ram 4 together with a hydraulic power unit or pack 5 are mounted on a beam 50 having a pair of wheels 18 which latter thus acts as a trolley 19. The upper end of the ram rod 41 carries a pivoted curved bearing pad 17 and is interlinked in the manner already described by pivotally connected pairs of arms 14, 16 with the base of the ram cylinder 40 where a further pivotally mounted curved bearing pad 47 is provided. The hydraulic power pack 5 comprises an oil reservoir tank 51, a pump 52 operated by a lever 53 and a control valve 54, the pump 52 being connected by a hose 55 to the lower end of the ram cylinder 40.

The apparatus 1 is fitted with an interlock mechanism shown in more detail in Figure 1a which, in conjunction with the key 3 of the cam, forces the operator to follow a safe sequence of working.

A blocking loop 502 is provided at the pivot point 504 to prevent insertion of the operating lever 30 in the incorrect side of the counterbalance. The opposite side is fitted with a fixed housing 506 which contains a keyed baulk ring 508. This ring 508 can rotate freely within the housing to maximum limits of $\pm 20^\circ$.

The counterbalance frame is fitted with locating hooks 510 which mount the unit on the protruding hinge of the column.

The operating lever 30 is provided with a circumferential groove 512 which allows the lever 30 to rotate within the baulk ring 508 only once it has been fully passed through the hinge of the column.

In operation, the counterbalance is lifted into position on the hinge of the column and held in place by the locating hooks 510.

The lever 30 can be passed through the baulk ring 508 but the key is 90° out of phase with the key within the cam of the column. Only when the ram has been extended will the keys
5 of the baulk ring 508 and cam align and allow the lever 30 to pass through the hinge.

The limited rotation of the baulk ring 508 within its housing 506 prevents the cam being unlocked until the lever 30 is fully inserted and the baulk ring key is aligned with the circumferential groove 512.

Unlocking the cam requires a 180 degree turn of the lever 30 which takes the cam and baulk
10 ring keys out of phase and prevents the operating lever 30 from being removed with the column unlocked. The keys remain out of phase at all times during lowering.

Only by raising the column and rotating the cam to lock it can the key of the cam and baulk ring be realigned and the operating lever 30 removed.

The apparatus 1 is wheeled against the column 2 and raised so that the pivot bushes at 15 of
15 the arm linkage 14, 16 are aligned with those at 23 of the downward extension 21 for insertion therethrough of the lever operated pin 3 again in the manner already described. In this position the upper pivoted bearing pad 17 bears against the downward extension 21 and the lower pivoted bearing pad 47 bears against the base portion of the lower column part 22.

Firstly the ram rod 41 is extended by operation of the pump lever 53 and the control valve
20 54 is closed. After release of the column upper part 20 from the lower part 22 by disengaging an internal locking wedge and also by operation of the internal cam mechanism by the lever 30 and pin 3, the upper column part 20 can then be gently lowered against the counterbalancing compression action of the ram 4 (Figure 3). During such lowering the control valve 54 is opened slightly for restrained lowering of the column upper part 20 and

is then closed after the upper part 20 has been fully lowered to the substantially horizontal position.

In the arrangement of Figures 6 to 8 a double acting ram 44 is employed and is carried on rests 56 of the power pack trolley 19 for wheeling to a column. Thus the base of the ram cylinder 40 is pivotally connected to gusset plates 26 on the mounting base plate 27 whilst
5 the jacking lug 43 is received in the slot 28 of the column upper part 20.

In Figure 9 the double acting ram 44 is carried on a power pack trolley 19 for wheeling into position of use. In this form of the apparatus the pump of the power pack is driven by an electric motor.

10 After withdrawing the locking screw 25 from the upper part 20, further extension of the ram 4 lifts the lower end of the downward extension 21 out of engagement with locking lugs 29 (Figure 4) opposite to the plates 26 to enable the upper part 20 to be swung down and against the counterbalancing ram 44 about the pivot 23. A locking plate 230 at the pivot 23 can be rotated to retain the column upper part 20 in the raised position so that the downward
15 extension 21 remains clear of the locking lugs 29 prior to and during initial lowering of the upper part 20 (see Figure 4). It should be noted that the locking screw 25 is screwed into or from the column upper part 20 through the locking plate 230.

The action of the locking plate 230 between co-operating abutments 200 on the column upper part 20 is shown diagrammatically in Figure 4 and also in relation to corresponding
20 positioning of the downward extension 21 of the upper part 20 relative to the locking lugs 29 ie up to the commencement of lowering of the upper part 20. Likewise operation of the locking plate 230 in relation to location of the downward extension 21 following final raising of the upper part 20 is shown in Figure 5.

To raise the column upper part 20 the pump lever 53 is operated to extend the ram 44 and,
25 after location and locking of the upper part 20 on the lower part 22, the apparatus is then

removed with retraction of the ram 44 as in Figure 6 for a manual pump and Figure 9 for an electric pump .

For heavy duty use and as shown in Figures 10 to 12 a pair of parallel double acting rams 44 are mounted on their own trolley 190 for wheeling to a column 2, the trolley 190 remaining
5 attached to the rams 44. Each extended piston rod 41 is pivotally connected by removable pins 46 to corresponding lugs 240 on the column upper part 20 which latter is pivotally mounted at 23 on the lower part 22. The base of each ram cylinder 40 is removably pivotally connected by pins 42 to respective gusset plates 26 on the mounting base plate 27.

After connection of the rams 44 in the above manner to the column 2 and release operation
10 of the locking screw 25, the ram piston rods 41 are further extended to lift the lower end of the downward extension 21 out of engagement with locating lugs 29 (Figures 4 and 5) at the opposite side of the column lower part 22 to the pivot gusset plates 26. At the same time the locking plate 230 is rotated to retain the column upper part 20 and its downward extension 21 in the raised position. The column upper part 20 can then be swung down against the
15 counterbalancing action of the rams 44 (Figure 12). A chain 90 is shown provided to loosely retain the trolley 190 by its handles 91 relative to the column upper part 20. The rams 44 are supplied with hydraulic oil and controlled from a power pack on a separate trolley. The pump is shown driven by an electric motor and the control valve is preferably such that immediately it is released the pump stops thus safely stopping angular movement of the
20 column upper part 20 at the position which it has reached.

In all of the hydraulic forms of the apparatus a restrictor valve is incorporated in the hydraulic system to restrain lowering of the column upper part 20 in the event of failure of the ram 4, 44 and/or hose.

CLAIMS

1. Column counterbalancing apparatus comprising fluid pressure operated means (1) such as a single double acting ram or rams (4,44) which can be engaged with (17, 47) or connected to (46,43;42,26) respective upper and lower parts (20, 21; 22) of a column (20) so
5 as to act between them in counterbalancing lowering of the column upper part (2) or raising thereof.
2. Counterbalancing apparatus according to claim 1 wherein fluid pressure operated means (1) thereof comprises a ram (4) having a bearing member or pad (17,47) one at each end and adapted to have bearing engagement with respective parts (20, 21; 22) of the column
10 (2) whereby the ram (4) counterbalances the column upper part (20) and an appropriately controlled fluid pressure operation (5,54) effects counterbalanced restrained lowering of said upper (20) on raising thereof, said fluid pressure operated means including linkage (14,15,16) for connecting the ram (4) to the column lower part (22).
3. Counterbalancing apparatus according to claim 2 wherein the linkage (14,15,16) is
15 arranged to be pivotally connected to the column lower part (22) at the pivotal connection (23) of the column upper part (20) thereto.
4. Counterbalancing apparatus according to claim 2 or 3 wherein the linkage (14,15,16) comprises pivotally connected arms (14,16) pivotally extending from the upper and lower ends of the compression spring means (1) or ram (4), the pivotal connection (15) of the arms
20 (14,16) being connected in use to the column lower part (22).
5. Counterbalancing apparatus according to claim 1 wherein fluid pressure operated means (1) thereof comprises a ram (4,44) adapted to be pivotally connected (42,26) at its lower end to the column lower part (22) such as to a mounting base plate (27) of the latter, the upper end of the ram (4,44) being adapted to be pivotally connected (46) to the column
25 upper part (20).

6. Counterbalancing apparatus according to claim 5 wherein pivotal connection (46) of the ram (4,44) to the column upper part (20) includes a lug (43) adapted to be retentively engaged with a slot (28) through the column upper part (20).
7. Counterbalancing apparatus according to claim 1 or 5 wherein a pair of parallel rams (44) are arranged to act between the upper and lower parts (20,22) of the column (2) in counterbalancing lowering or raising of the upper part (20).
8. Counterbalancing apparatus according to any of the preceding claims wherein the fluid pressure operated ram means (4,44) is wheel mounted for general mobility and in particular to facilitate application to and engagement or connection with the column parts (20,21;22).
9. Counterbalancing apparatus according to claim 9 wherein hydraulic ram means (4,44) and a power unit or power pack (5) for supplying hydraulic fluid under pressure to the ram means (4,44) are carried by a wheeled trolley (19) or the hydraulic ram means such as a pair of parallel rams (44) and the power unit or power pack are separately trolley mounted (19,19).

1/8

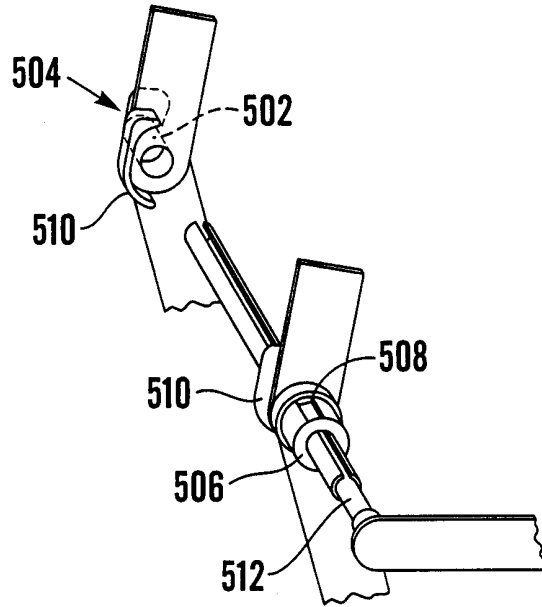


Fig. 1a

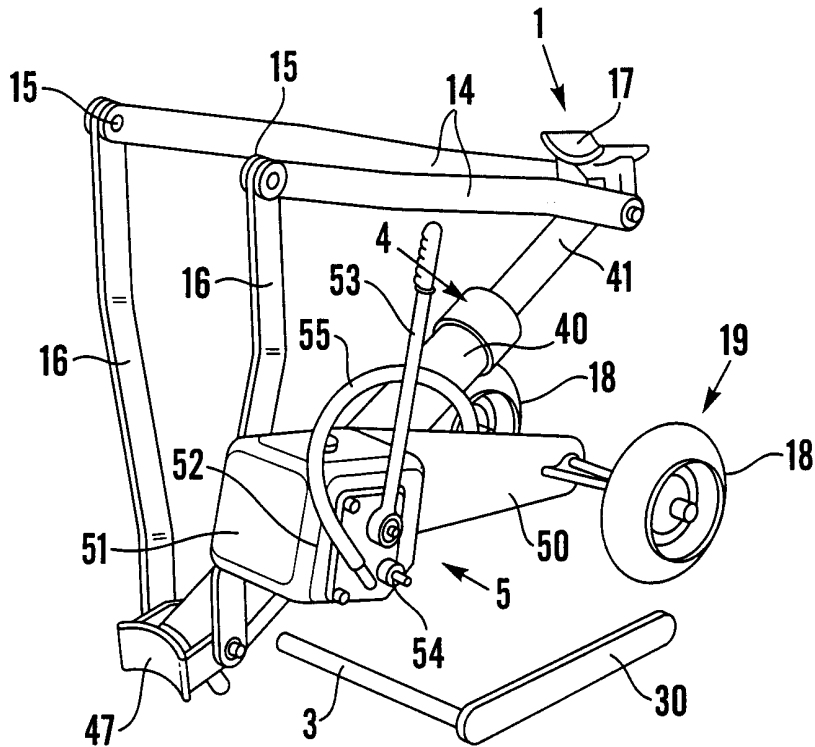


Fig. 1b

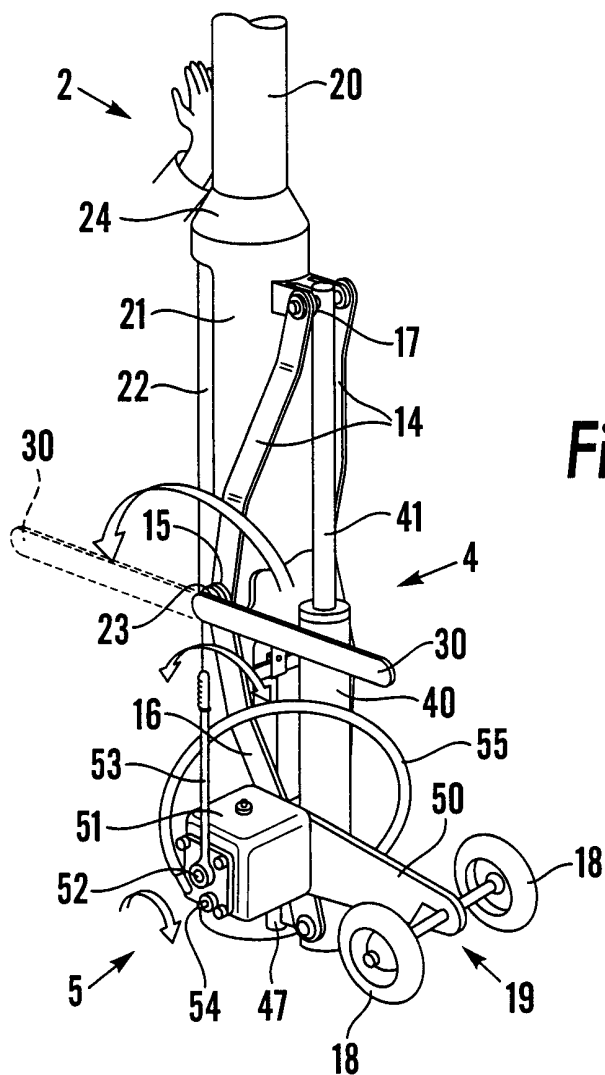


Fig. 2

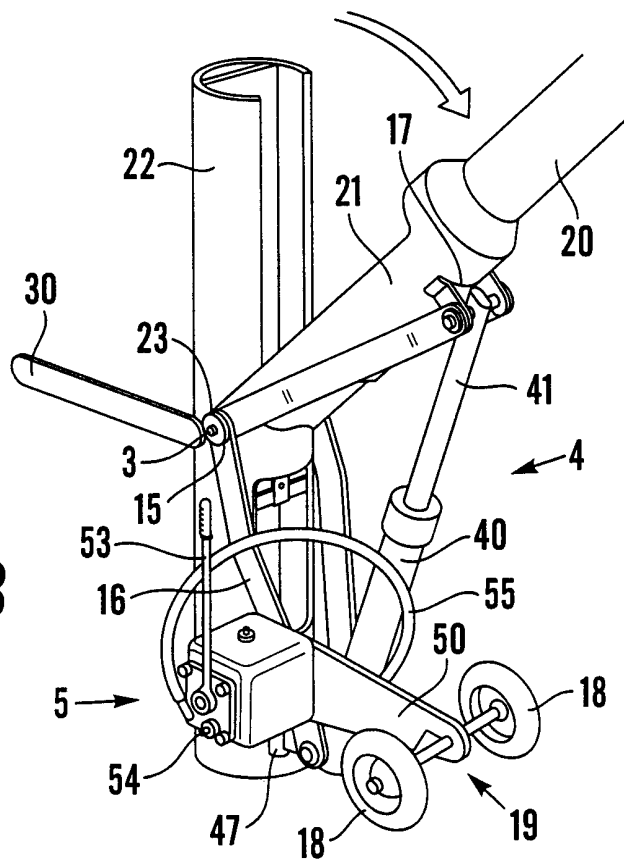


Fig. 3

3/8

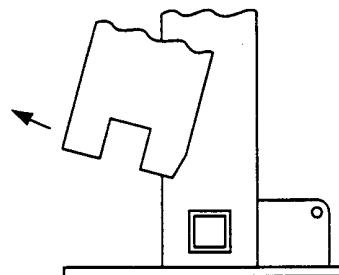
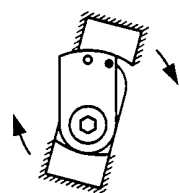
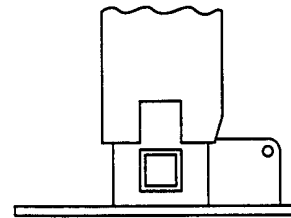
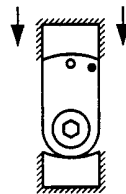
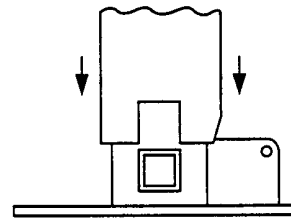
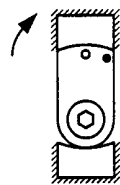
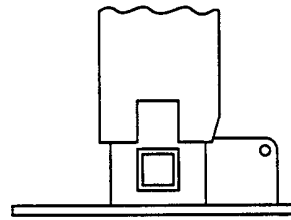
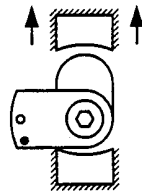
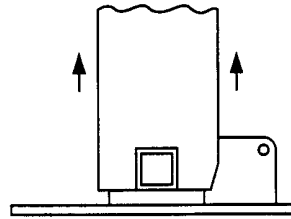
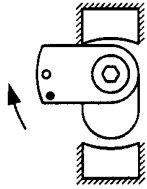
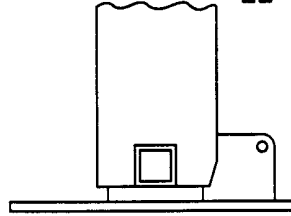
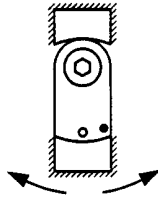
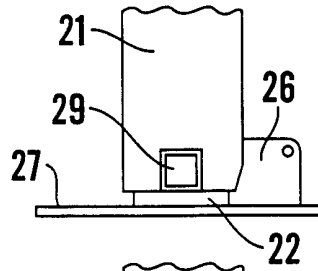
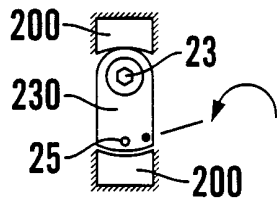


Fig.4

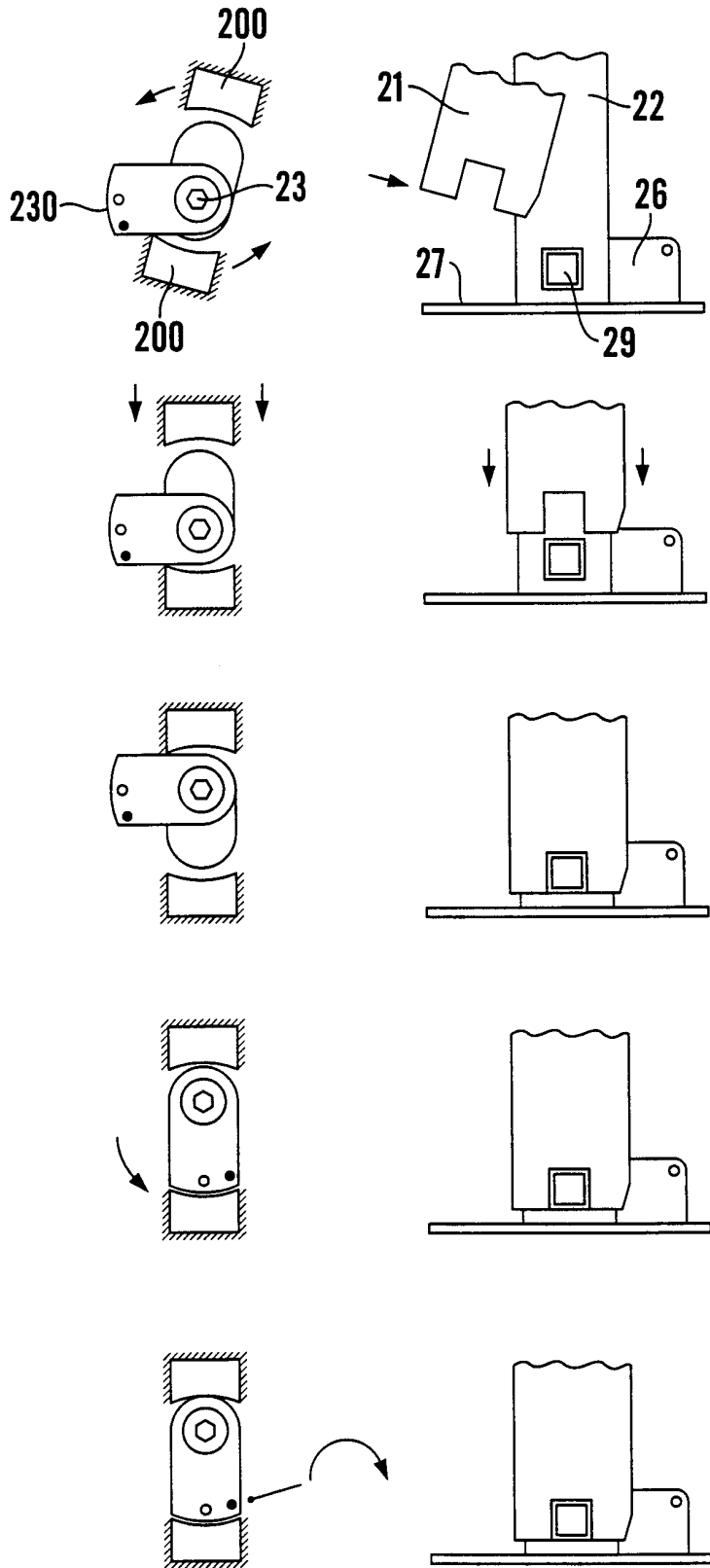


Fig.5

5/8

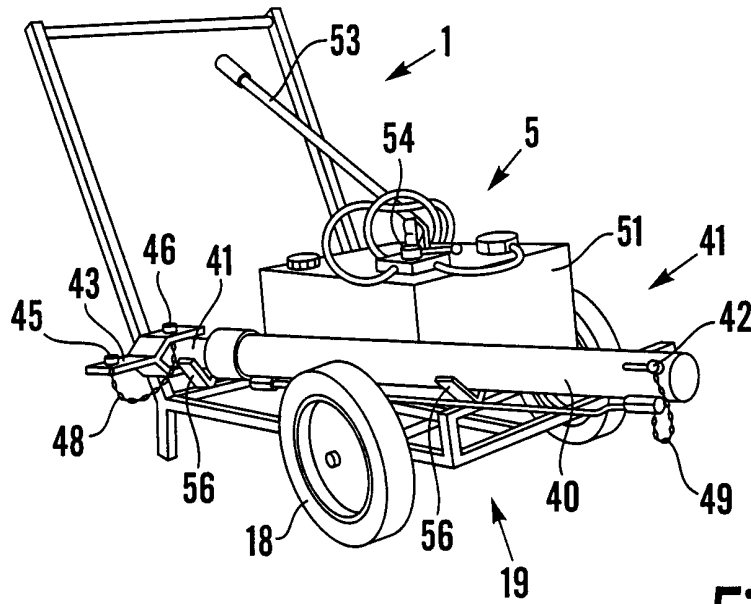


Fig. 6

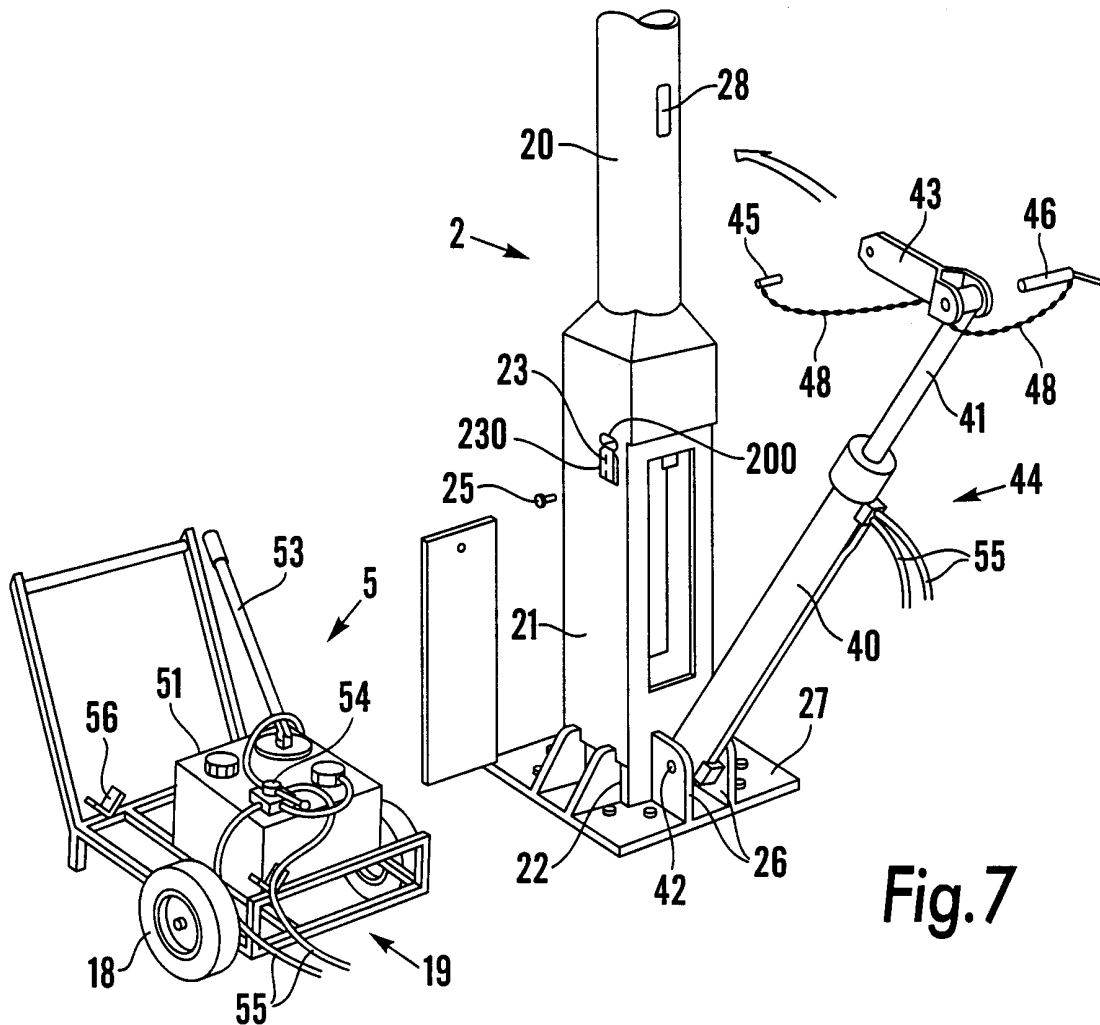


Fig. 7

6/8

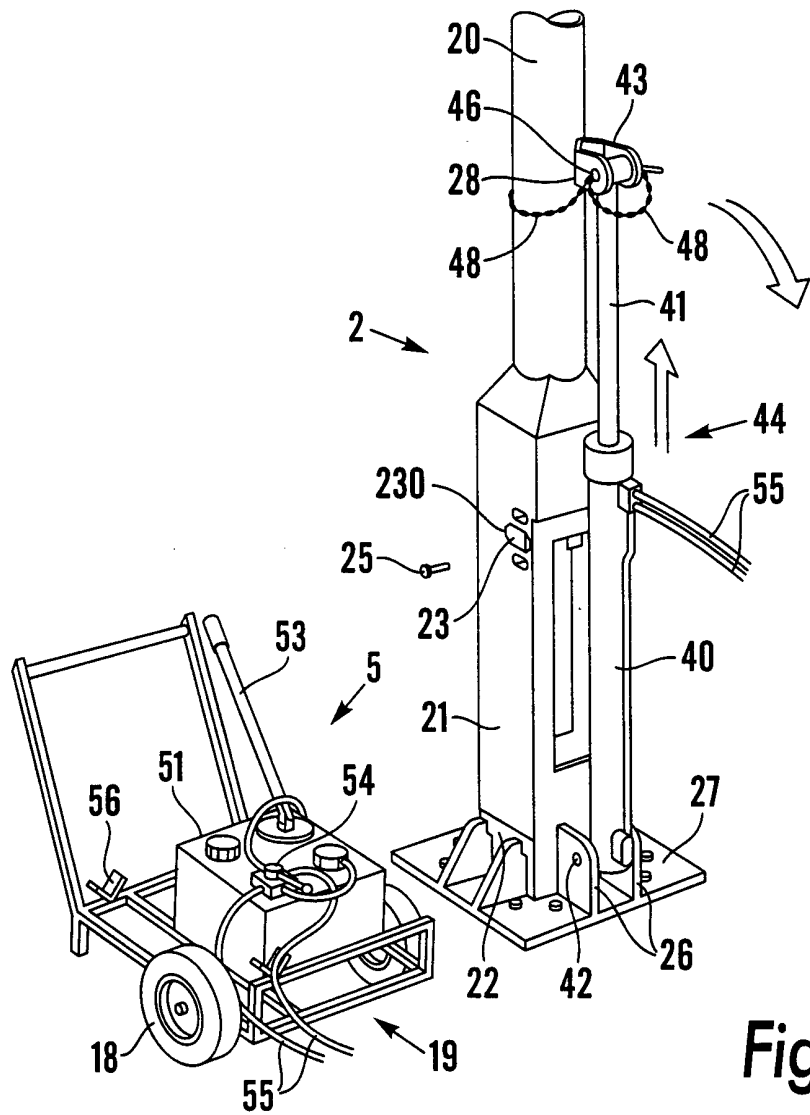


Fig. 8

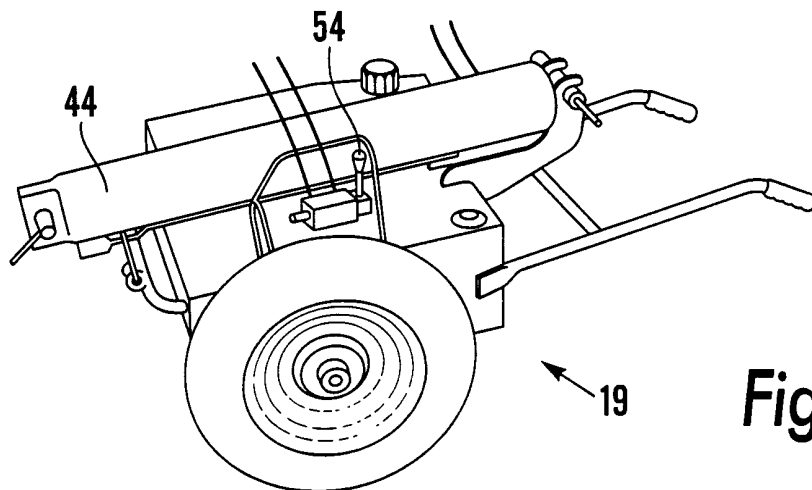


Fig. 9

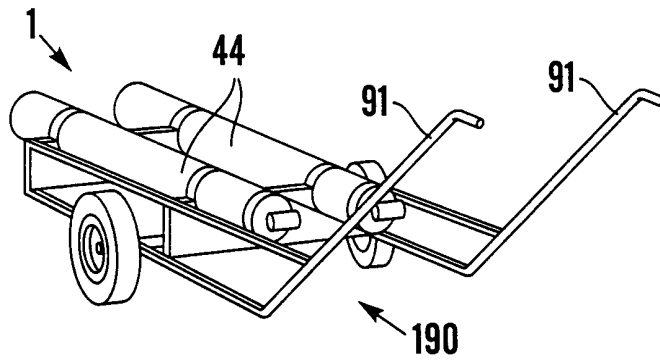
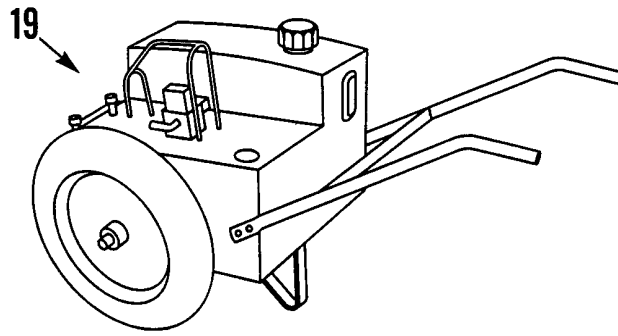


Fig. 10

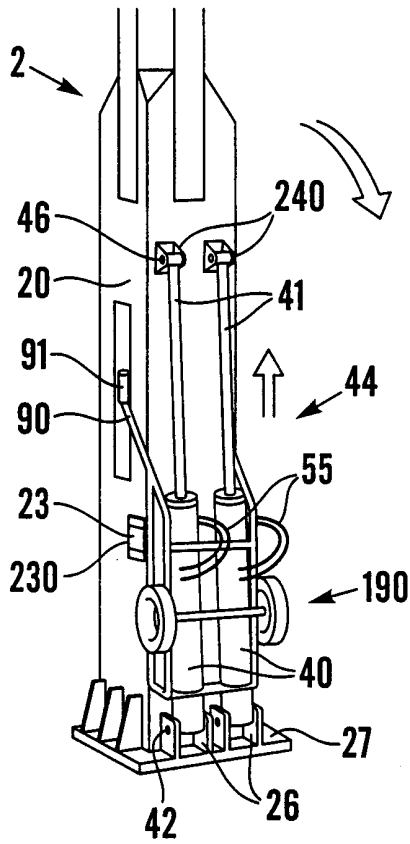


Fig. 11

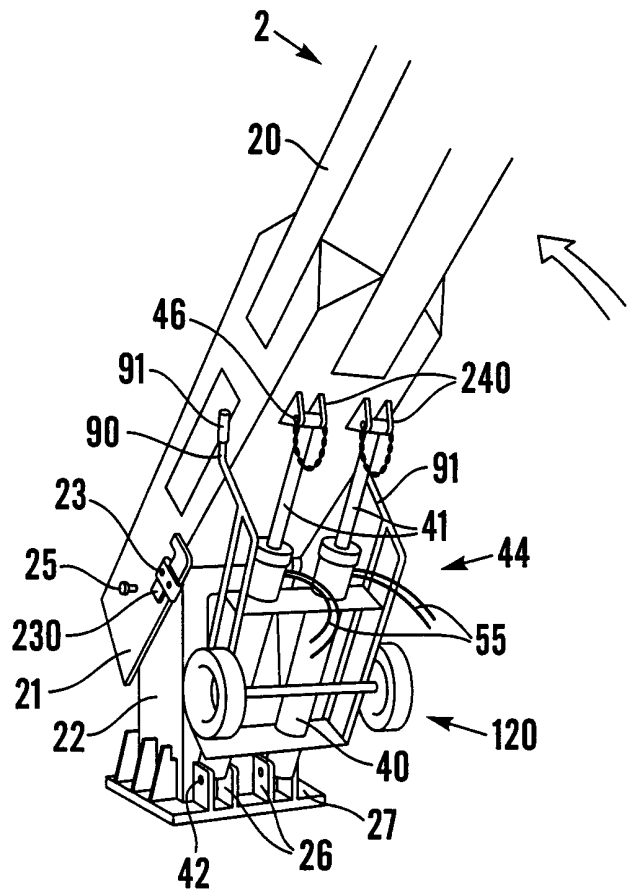


Fig. 12

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 99/01202
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A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 E04H12/34 E04H12/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 23 19 877 A (ABACUS ENG LTD) 8 November 1973 (1973-11-08) the whole document ---	1-3, 5, 6
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Date of the actual completion of the international search 16 December 1999	Date of mailing of the international search report 12/01/2000
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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

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